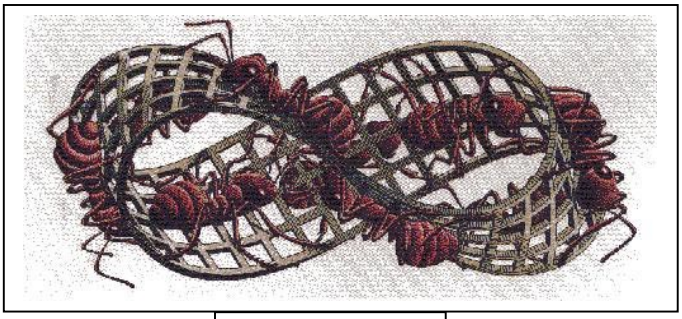
Activity #11: Investigation of the Moebius Strip (Student version)
Math

Note: Students must work in pairs for this activity and record one set of responses on the worksheet. As you work in pairs, you may want to discuss your results with other teams.

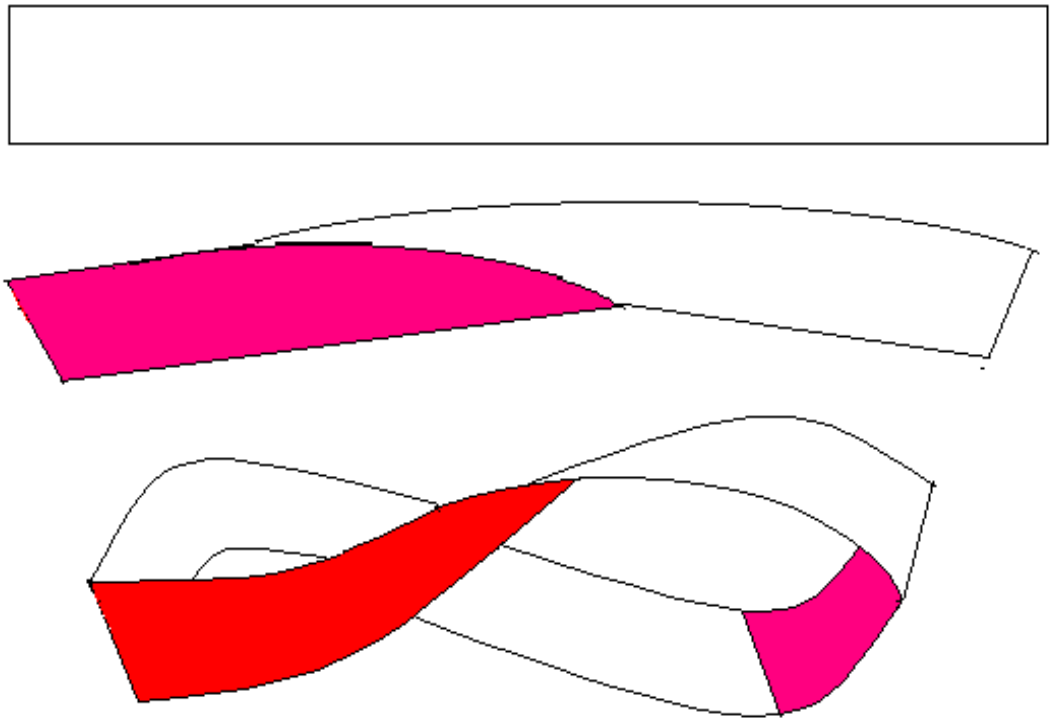


by M. C. Escher

Purpose: **To begin investigation of topology**
To guess conclusions given hypotheses
To experiment to prove conclusions valid (or invalid)
To use previously learned knowledge

Materials: graph paper (4 units per inch), tape or stapler, red crayons

Procedure:
1. Cut 12 strips, each 11" long and one inch wide from the graph paper.
2. Take one strip and color one side red.
3. Take this strip, make a loop with it, and turn one end over before taping the ends together. You have constructed a Moebius strip or band.



Investigation Steps:

1. Put your pencil in the middle between the edges of the Moebius and draw a line down the center. Stop when you get back to that same point.
You should notice that you do not go over the edge of the strip on your move back to the starting point. You have only 1 side!

2. Take this Moebius strip and cut parallel to the edge about in the middle, right along the line you just drew. What happens? _____

_____

_____

_____

3. Make another Moebius strip and cut parallel to the edges about one-third of the way from one edge. What do you think will happen? _____

_____

_____

_____

Describe what happens. _____

_____

_____

_____

4. Make another Moebius strip and cut parallel to the edges about one-fourth of the way from one edge. What do you think will happen? _____

_____

_____

_____

Describe what happens. _____

_____

_____

_____

5. What would happen if you cut another Moebius strip parallel to the edge only this time, one-fifth of the way from one edge? Are you sure? If not, verify.

_____

_____

_____

6. Make a loop with two half-twists. Put your pencil in the middle between the edges of loop and draw a line down the center. Stop when you get back to that same point. How many sides does this loop have? _____

7. Take this loop and cut parallel to the edge about in the middle, right along the line you just drew. What happens? _____

_____

_____

8. Make another loop with two half-twists. Take this loop and cut parallel to the edges about one-third of the way from one edge. What happens? _____

_____

_____

_____

9. Make a loop with three half-twists. Put your pencil in the middle between the edges of loop and draw a line down the center. Stop when you get back to that same point. How many sides does this loop have? _____

10. Take this loop and cut parallel to the edge about in the middle, right along the line you just drew. What happens? _____

_____

_____

11. Make another loop with three half-twists. Take this loop and cut parallel to the edges about one-third of the way from one edge. What happens? _____

_____

_____

12. Make another loop with three half-twists. First, try to guess what happens when you cut this loop one-fourth of the way from an edge. Then, take this loop and cut it. What happens? _____

_____

_____

_____

Follow-up Activities:

1. Write a one-page paper describing what you experienced while you worked on the activity.

2. Look up "topology" and prepare a short speech to deliver to class, using visuals or manipulatives if necessary to help clarify meaning.

3. Prepare a report on M. C. Escher.

4. Prepare a report on Augustus Ferdinand Moebius.

5. Find evidence of the practical uses of Moebius strips and present your findings to classmates in a short speech.